Seminar and Roundtable on Coalbed Methane Development and Potential

TURKEY

September 10, 1998 *Country Fact Sheet*

Current CBM Activities

Only initial investigations to assess Turkey's coalbed methane capture and utilization potential have been conducted. Turkey presently does not have economically significant CBM production. The Black Sea Coast area of Turkey has substantial hard coal and coal-related resources; substantial amounts of methane are continuously emitted from the coal mines. Recovery and use of this methane could be beneficial for everyone because of reduced future methane-related hazards to miners and improvement to the local and global environment.

Key Factors in Energy Economy

Turkey has a growing demand for energy. Turkey is now dependent upon imported energy for a substantial portion of its energy needs. In particular, natural gas demand is increasing faster than the supply. The demand for natural gas used for power generation is increasing even more rapidly than overall demand. Gas will be a key factor in Turkey's future economic performance and strategic stability. Turkey needs reliabile gas supply sources and would benefit by reduced imports.

Potential Role of CBM in Energy Economy

CBM from the Zonguldak hard coal region could be a very significant factor in Turkey's energy economy. Development of the methane gas resources will alleviate some of the current and future shortages of energy in Turkey. The resources identified could fuel gas-fired power plants and supply feedstock to a newly created petrochemical complex. Electric power could be distributed to the power grid and targeted to existing and new industries.

CBM Potential

The CBM in-place resources in two districts of the Zonguldak hard coal region are presently estimated to be at least 3 trillion cubic meters (TCM). Assessment of the CBM resources in the third, largest district is continuing.

Existing Policies Affecting CBM Development

CBM development will, of course, have to comply with applicable Turkish laws and regulations. Turkish tax laws embody incentives, which may be applicable to development of CBM resources. For example, an investment allowance, a deduction from taxable income, is 100% for priority development regions and for certain types of investment projects and expenditures. Various exemptions from customs, duties, and taxes may apply and be accessible because of the project's geographic location, business sector, and the ownership interest of a Turkish partner.

Overseeing or Permitting Government Agencies

The Hard Coal Enterprise of Turkey (TTK), a state owned legal entity, has the rights for exploring and exploiting underground coal resources in its defined area near the Black Sea in Turkey. TTK divided its privileged operations area into three Districts and tendered the exploration and exploitation rights for coal bed methane. As a result of the bidding in December 1996 for Districts 1 & 2 and a 1998 transfer of District 3 rights, the Data Su Sondajlar A.S.-DanOil LLC Joint Venture has agreements granting the right to explore and exploit the coalbed methane gas resources for which TTK has the rights of exploration and exploitation.

Potential Barriers to CBM Development

No policies specifically impeding CBM development have been identified. Potential barriers are the requirements for and logistics of importing equipment. Training Turkish personnel is required. Infrastructure for operations and equipment mobility must be developed as must maintenance facilities and machine shops. Power plant development will generate demand for turbines, electrical equipment, transformers, transmission lines, electronic equipment, and computerized systems.

Donors/ Companies/ Investors Active in CBM

- In Turkey, to date no donors or companies except the above-mentioned joint venture have been active in CBM.
- CBM will be a new and significant energy resource for Turkey.

Coalbed Methane Capture and Commercial Utilization

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Status

Research Activities, 2nd stage being planned
Development partners being sought

Location

Black Sea Coast, Zonguldak hard coal region, Turkey. The TTK District 1 rights cover 722 square miles (1870 square kilometers). The TTK District 2 rights cover 1,006 square miles (2605 square kilometers). The TTK District 3 rights cover about 3300 square miles (8448 square kilometers). The areas evaluated to date (July 98) for in-place coalbed methane gas resources are 39 square miles (101 square kilometers) for District 1 and 63 square miles (161 square kilometers) for District 2, substantially all of which are onshore; 368 square miles (953 square kilometers) are being evaluated in District 3.

Technical Summary

The Joint Venture engaged the services of Raven Ridge Resources, Incorporated, to estimate the District 1 and 2 coalbed methane gas resources during 1997. Raven Ridge Resources estimated that the in-place coalbed methane gas resources in Districts 1 and 2 in the Westphalian coal and sandstone reservoirs exceed ninety trillion cubic feet (2.56 trillion cubic meters), most of which is estimated to be in the sandstone reservoirs. The research study for the more recently

acquired District 3 is presently (August 98) underway.

The aggregate thickness of the Westphalian coal-bearing strata exceeds 1,000 meters. Raven Ridge Resources has not estimated resources for the Namurian coal-bearing interval that underlies the Westphalian Kozlu coal measures; numerous prospective coals and sandstones occur in the Namurian sediments. Significant coalbed methane gas resources may occur in the Namurian. Westphalian coal samples collected from actively mined areas were analyzed to determine source rock characteristics. The testing suggests that these coal samples can be classified as humic and are mature to late-mature Type II and Type III kerogen coals and are the likely source of gas condensate and minor quantities of oil.

Estimated Capital and O&M Costs

Research Activities, 1st Phase: privately funded, resulting in geological estimates of very large coalbed methane gas resources.
Research Activities, 2nd Phase: $15 - 20 million; seeking to verify the commercial feasibility of exploiting this methane gas as an energy resource. Some conventional hydrocarbon drilling has occurred in this area, but no drilling or testing for coalbed methane gas has been previously attempted in this geographic area, which has complex geology and limited infrastructure.
Development Activities: $1 - 1.5 billion

Sources of Revenue

Gas sales for distribution to new, efficient power plants and other residential and commercial customers. Initial gas production can be distributed through portable generators.

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Proponents/ Sponsors of the Project

- Data su Sondajlari A.S.-DanOil L.L.C. Joint Venture, a Turkish contractual joint venture
- DanOil principals have extensive successful prior experience in United States, Canadian, and North Sea oil and gas projects.

Lessons Learned

CBM's legal status in Turkey is now clarified. Many relevant Turkish laws and regulations are not officially translated into English. CBM evaluations may differ from natural gas.